

Applied Stream Science

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US Army Corps of Engineers
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Applied Stream Overview

- Stream Facts, regulatory Review & Stream Definition
- Examples of Degraded Streams
- Sources of Stream Impacts
- Compensating for Stream Impacts – Stream Restoration



Kentucky Stream Facts:

- Kentucky has approximately 90,000 miles of *mapped* streams
- Second only to Alaska in navigable stream miles
- Only state in the U.S. bordered by major rivers on three sides:
Mississippi, Ohio, and Big Sandy Rivers



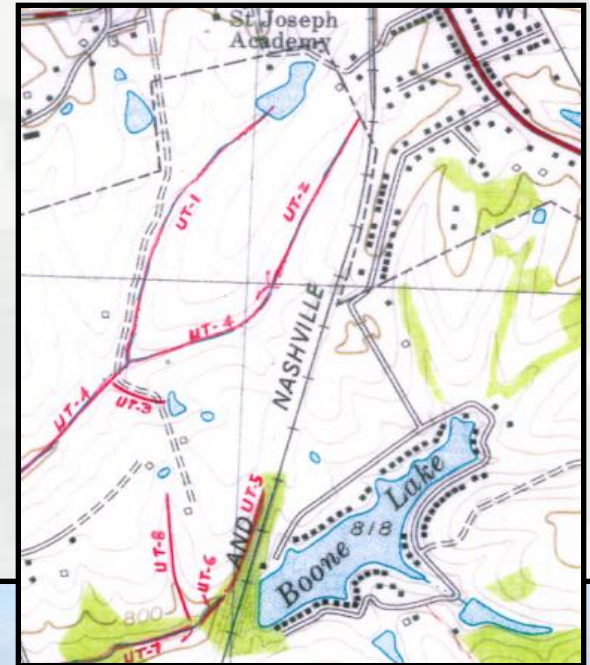
Regulatory Review & Stream Definition



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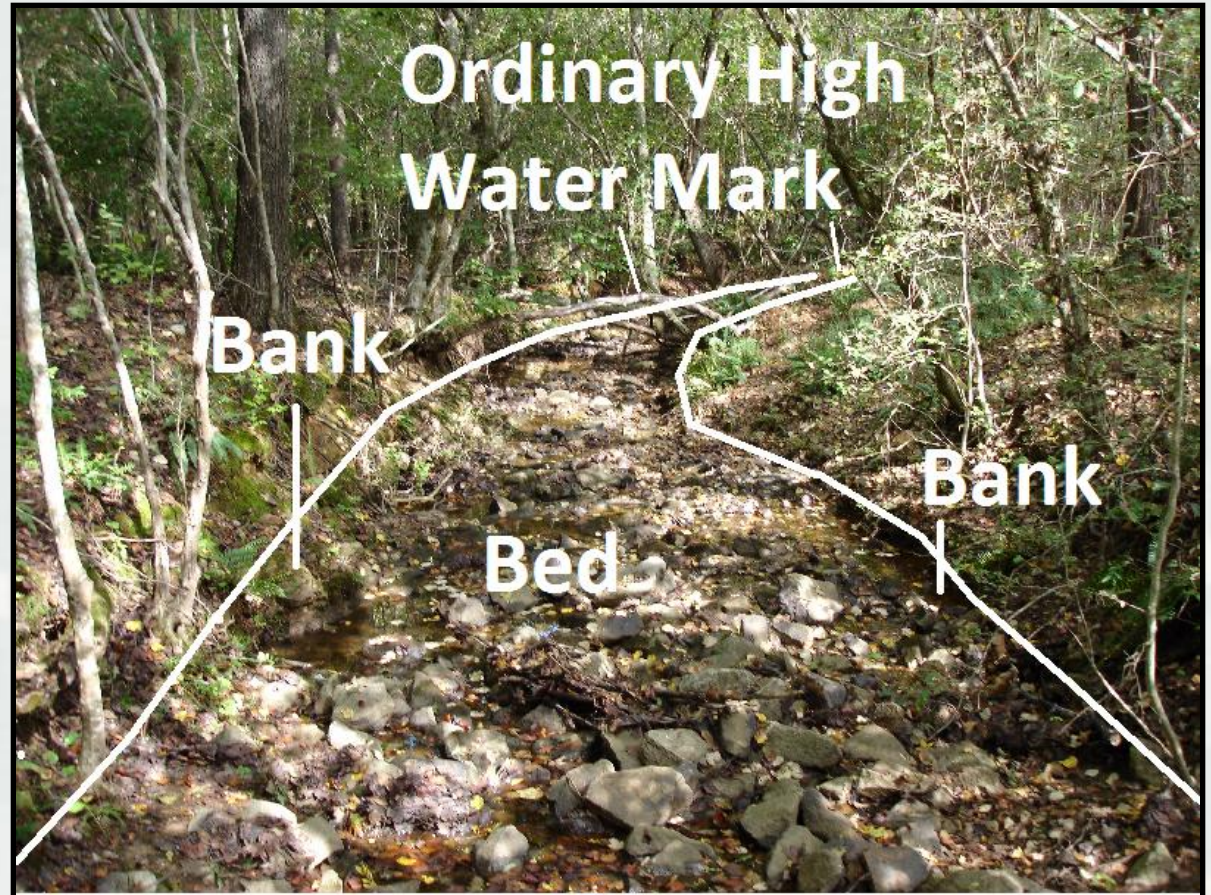
Regulatory - Review

- Jurisdictional Determinations
- Issue permits:
 - ▶ Section 404 CWA
 - ▶ Section 10 R & H Act 1899
- Compliance/Enforcement



Regulatory Definition

- Bed
- Bank
- Ordinary High Water Mark



Degraded Streams: The good, the bad & the ugly...



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Degraded Streams

Ephemeral



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Degraded Streams

Intermittent Streams



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Degraded Streams

Perennial Streams



Sources of Impacts



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Impacts to Streams

Culverts & Piping



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Impacts to Streams

Channelization



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Impacts to Streams

Detention/Retention



Impacts to Streams

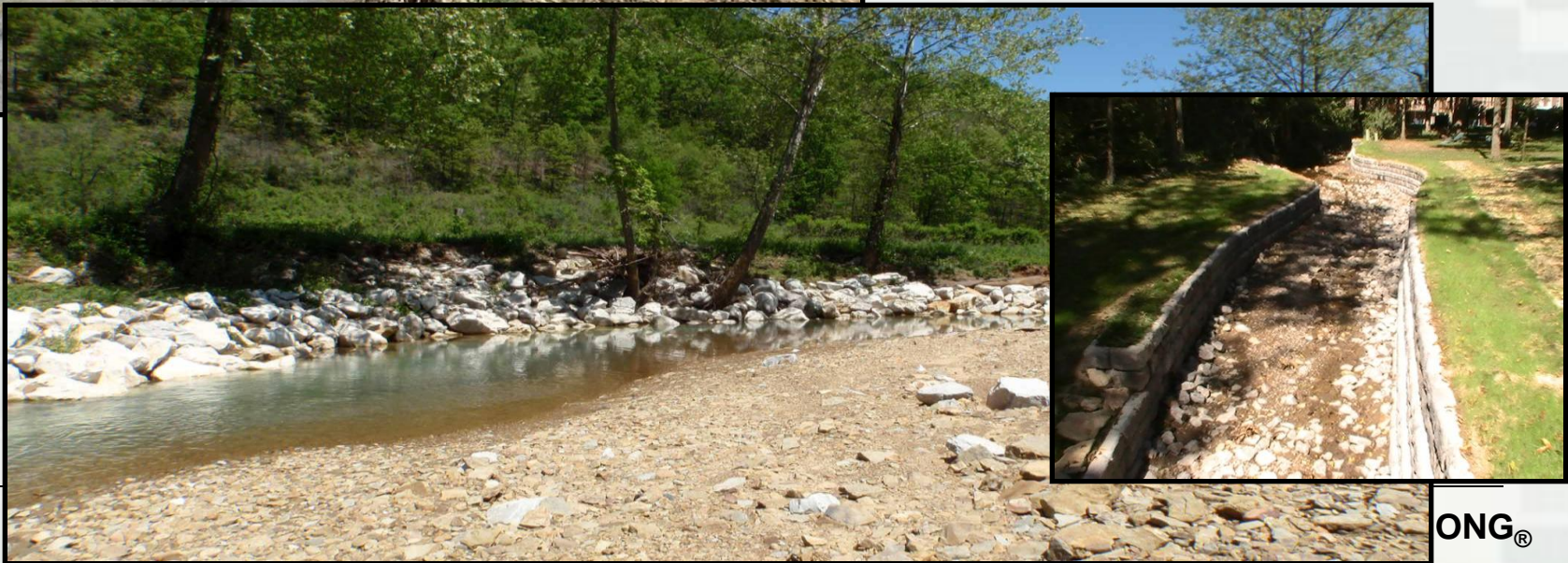
Relocation



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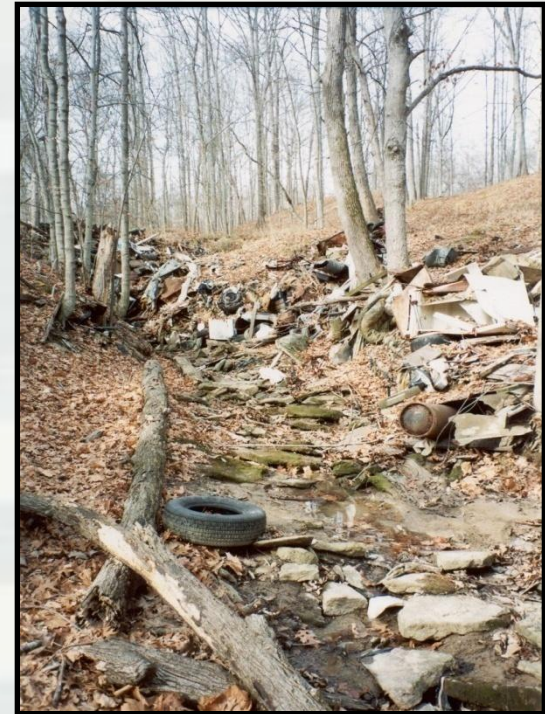
Impacts to Streams

Bank Hardening



Impacts to Streams

Fill/Grading & Dumping



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Impacts to Streams

Agriculture



Impacts to Streams

Concrete Lining



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Impacts to Streams

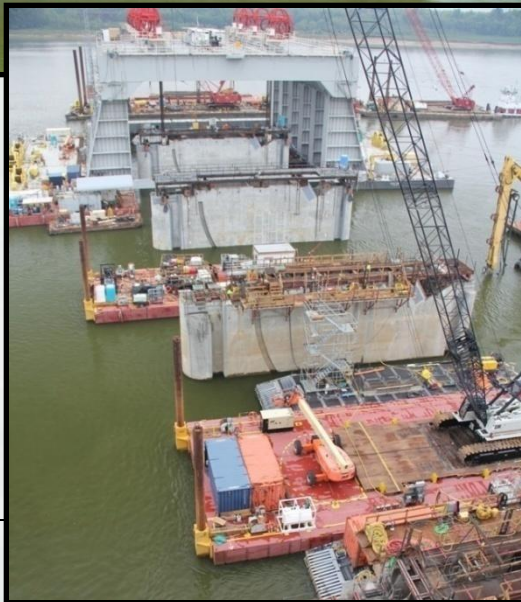
Crossings



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Impacts to Streams

Locks & Dams



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Impacts to Streams

Bridges



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Compensating for Stream Impacts: Stream Restoration

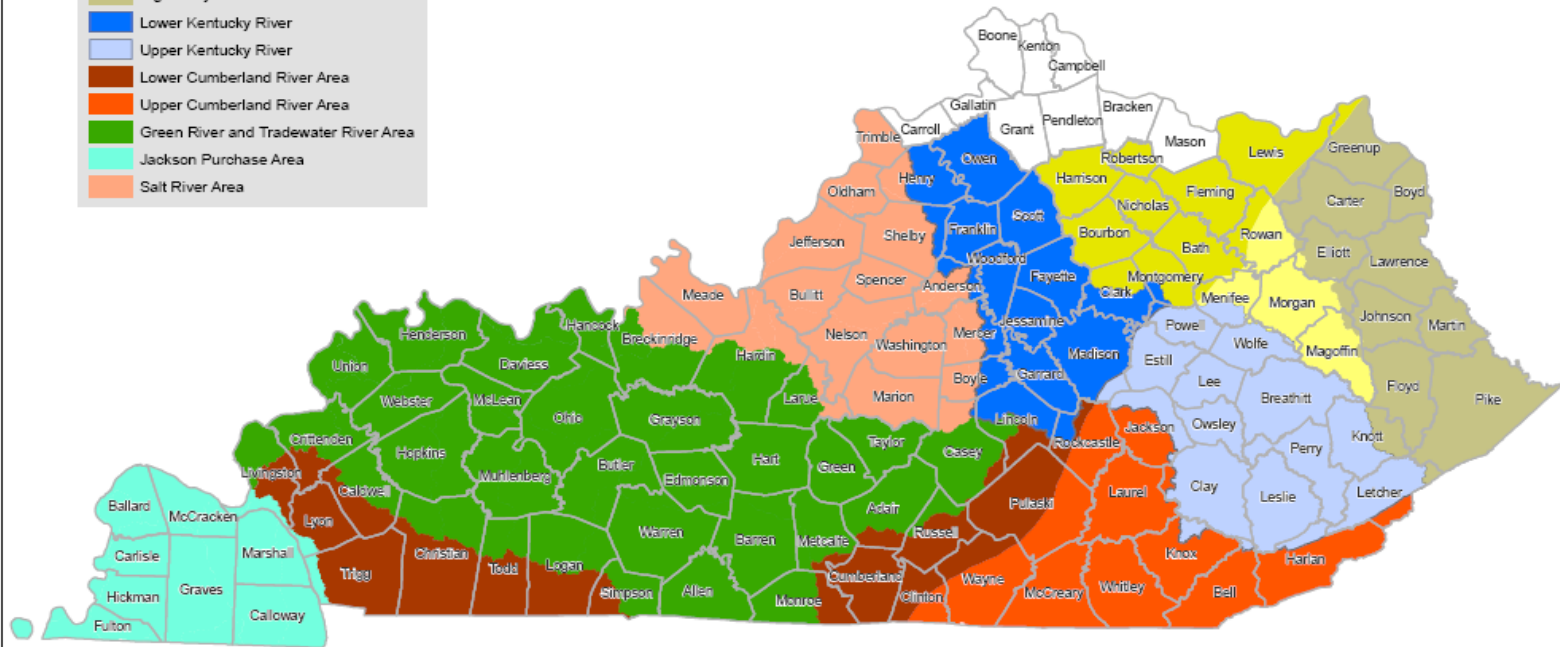
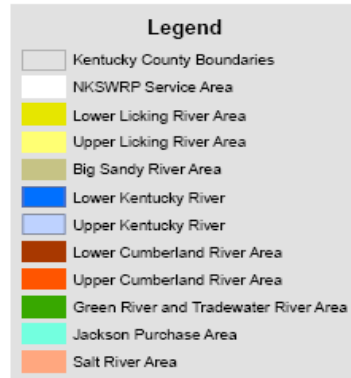


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Compensating for Stream Impacts

Stream Restoration

EXHIBIT 1



0 25 50 75 100 Miles

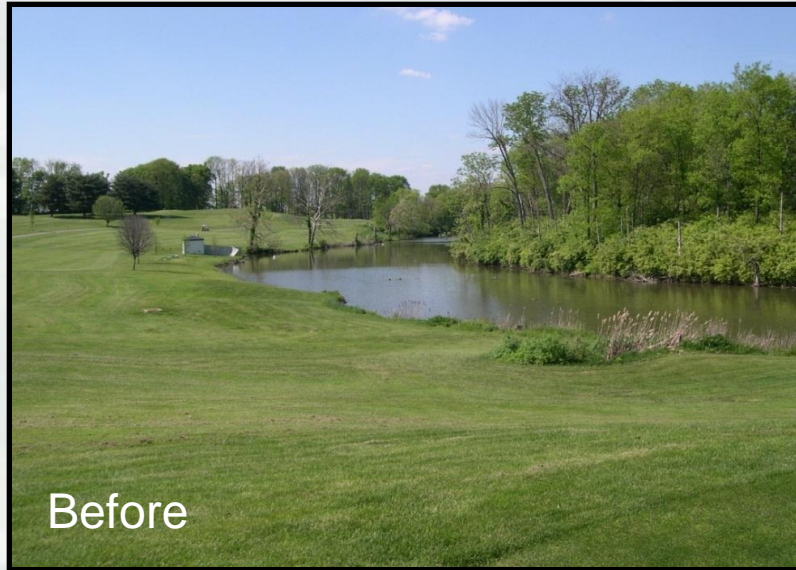
Scale 1:2,700,000



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Compensating for Stream Impacts

Stream Restoration



Ohio River Watershed: Florence Golf Course Stream Restoration

- 4.4 AC Pond Removal
- 2,500 LF of Stream (P + I) Restoration: floodplain & stream re-establishment & enhancement, culvert removal, bank stabilization
- Riparian Habitat Restoration



Compensating for Stream Impacts

Stream Restoration



Ohio River Watershed: Boone Woods Stream & Wetland Restoration

- 0.1 AC Wetland Restoration
- 4,500 LF Stream (P, I E) Restoration: re-establishment, bank stabilization, riparian restoration
- Riparian Habitat Restoration



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Compensating for Stream Impacts

Stream Restoration



Licking River Watershed: Joe's Creek Stream Restoration

- 0.8 AC Wetland Restoration
- 2,500 LF Stream (P + E) Restoration: watershed, floodplain & stream re-establishment & enhancement
- Riparian Habitat Restoration



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Compensating for Stream Impacts

Stream Restoration



Ohio River Watershed: Adair WMA Stream and Wetland Restoration.

- 0.34 AC Wetland Restoration
- 6,600 LF of Stream (P + I) Restoration: stream re-establishment & enhancement,
- Riparian Habitat Restoration



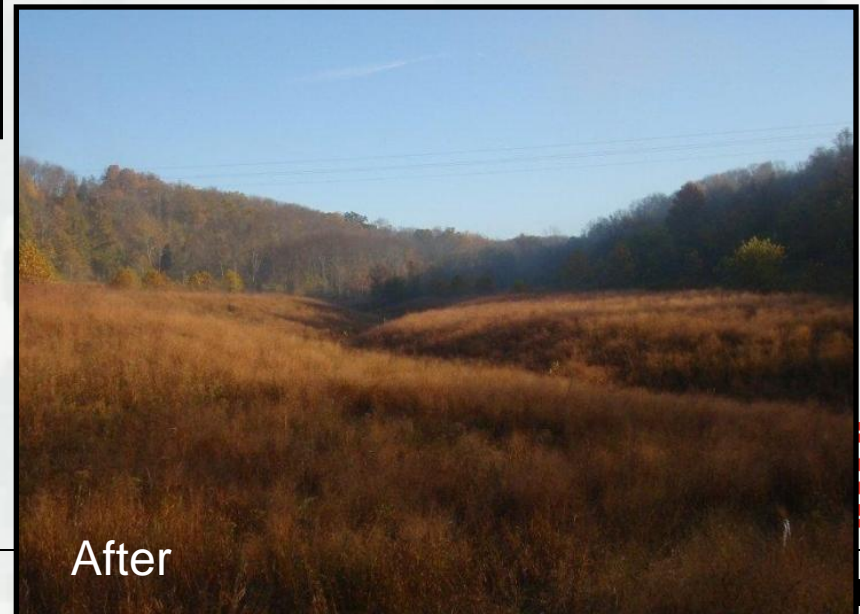
Compensating for Stream Impacts

Stream Restoration



Ohio River Watershed: Split Rock Stream & Wetland Restoration

- 1.5 AC Wetland Restoration
- 10,500 LF Stream (P, I & E) Restoration: Re-establishment & enhancement
- 5.0 AC Riparian Habitat Restoration



Compensating for Stream Impacts

Stream Restoration



Kentucky River Watershed: Mill Creek Elementary Stream & Wetland Restoration

- 0.1 AC Wetland Restoration
- 700 LF Stream (I & E) Restoration: aquifer and stream re-establishment
- Water quality treatment



Compensating for Stream Impacts

Stream Restoration



Kentucky River Watershed: Terry's Branch Stream & Wetland Restoration

- 1.5 AC Wetland Restoration
- 3,000 LF Stream (I & E) Restoration:
stream re-establishment & enhancement
- 5.0 Acres Riparian Forest

Compensating for Stream Impacts

Stream Restoration



*Cumberland River Watershed:
Buck Creek Stream Restoration*

1,240 LF Stream enhancement,
rehabilitation and re-establishment.

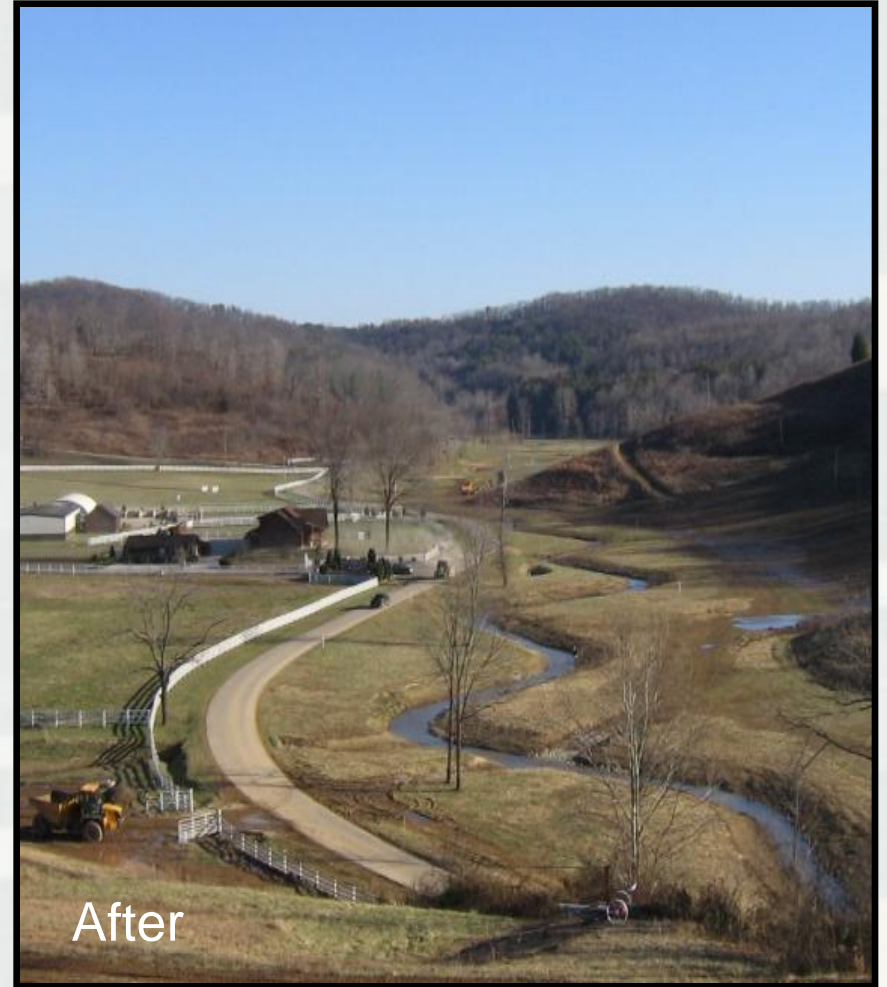


Compensating for Stream Impacts

Stream Restoration



Before



After

Big Sandy River Watershed: EF #2 Little Sandy Stream Restoration

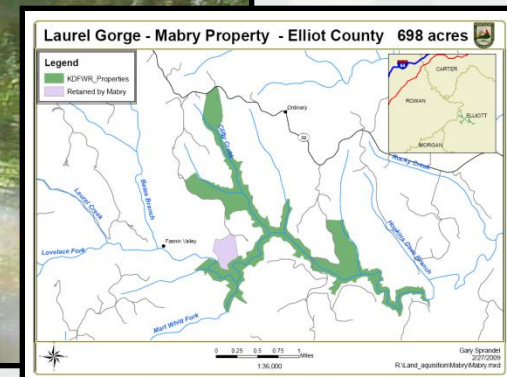


▪ 12,630 LF Stream (P, I & E) Restoration: Re-establishment

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Compensating for Stream Impacts

Stream Restoration



Big Sandy River Watershed: Laurel Gorge WMA

- 83,000 LF Stream (P, I, E) & 700 AC Watershed Preservation

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Questions?



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